

15th Annual Robofest[®] 2014 Rules

1-21-14 v2.0 Official Version



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Attachments:

Forms:

- o Consent, Release and Media Authorization Form:
<http://www.robofest.net/ConsentReleaseForm.pdf>
- o Age Division Waiver Request Form
<http://www.robofest.net/2014/ageWaiverForm14.pdf> (Fillable PDF, digital signature)
<http://www.robofest.net/2014/ageWaiverForm14.docx>
- o Video Qualifier Submission Form
<http://www.robofest.net/2014/RobofestVideoSubForm14.pdf> (Fillable PDF, digital signature)
<http://www.robofest.net/2014/RobofestVideoSubForm14.docx>

Rules for each competition Category:

- o Game Competition (Avoid Meltdown) Rules
- o Exhibition Competition Rules
- o Vision Centric Challenge (VCC) Rules
- o BottleSumo Rules
- o BottleZone Rules
- o Unknown Mission Challenge (UMC) Rules

These rules may be revised or refined during the season. Coaches are required to check the website and/or read emails about the possible changes.

0 Introduction and Competition Summary

Robofest® is an annual robotics competition designed to promote and support STEM (Science, Technology, Engineering, and Math) and Computer Science education through autonomous robotics. Robofest is an open competition, allowing teams to use any type of robotics platform in general and any programming language for the categories shown in Table 1.

Competition Category	Age (grade) Divisions	Team Size	Platform	Unknown factor	Assessment	Reg. fee(*2)	Note
Game: “Avoid Meltdown”	Jr. (5-8 th) & Sr. (9-12 th)	Max. 7	Any	Yes(*1)	Yes	\$50	Each team uses a fully autonomous robot to play this year’s game, Avoid Meltdown.
Exhibition	Jr. & Sr.	Max. 7	Any	No	Yes	\$50	Each team has complete freedom to show off any creative autonomous robotics project.

(*1) Problems or parameters unveiled on the day of competition

(*2) Per team. No refunds will be given; some qualifying sites may charge \$20 ~ \$25 Check-in fee; Sites outside North America may have different fee schedules.

Table 1. Robofest 2014 Main Competition Categories

Robofest also provides the following associate competitions that will be held during the World Championship (WC). World Championship 2014 will be held in Southfield, MI at Lawrence Tech University, May 16-17, 2014. Detailed information can be found in Section 14.

Competition Category	Age Divisions	Team Size	Platform	Unknown factor	Reg. fee per team	Note
Vision Centric Challenge (VCC)	Sr. (9-12 th)	Max. 3	Any vision-based robot	Partially unknown	\$50	For talented high school and college students. Competitions will be held at NAC and World Championship
	College	Max. 2	Any vision-based robot	Partially unknown	\$50	
BottleSumo	Jr.	Max. 3	Any	Partially unknown	\$50	World Championship
BottleZone	Sr.	Max. 3	Any	Partially unknown	\$50	World Championship
Unknown Mission Challenge (UMC)	Jr. & Sr.	Max. 3	Lego NXT	100%	\$50	World Championship

Table 2. Robofest 2014 Associate Competition Categories

See attached separate document for each Competition Category rules.

1 General Team Rules

A. Team Formation

- Any organization, such as a school, home school, civic organization, club, etc. can form teams.
- Age divisions and grade levels for each competition category are indicated in the tables 1 and 2. Grade levels denote the student’s grade as of April 2014.
- For any exceptions in a student’s age or grade, the coach must submit an “*Age Division Waiver Request Form*” to Robofest administration for approval. The general rule is that playing up from Jr. to Sr. Division is fine as long as the student has exceptional talent in construction of the robot and computer programming, and has the maturity to work with other team members. Playing down is discouraged in general. The reason to request playing down must be specified on the form. For either playing up or playing down, coaches should obtain consent from their entire team and their parents.

4. A team member may join multiple teams *in other competitions, not the same category*. For example, a student can join a game team and an exhibition team. When a coach has multiple game teams, a student can join only one game team. Any exception of this rule must be approved by Robofest administration.

B. Team Registration

1. Teams are registered by a registered coach; a coach may have multiple teams using same coach ID #.
2. Team registration is processed on the web at <http://www.robofest.net>. See section 3 “Registration Process” for a detailed description of the registration steps.
3. The registration deadline is **3 weeks** before the competition date at each site. If a competition category at a site does not have 5 teams or more, teams registered at the site *may* be asked to move to another site; or teams can enter via video submission. (See Section 8)
4. There may be a \$20 ~ \$25 check-in fee at a qualifying competition site, which will be used solely by the competition host site. Each qualifying site web page specifies the fee amount under the “check-in fee” section.

2 Team Coach Rules

A. Coach Qualifications and Roles

1. Coaches must be adults without any criminal record.
2. The coach must have a valid email address and must check the email account regularly. Email is the primary and official communication method between the team and the Robofest organizer. If a coach's email address is changed, it is the coach's responsibility to update the Robofest registration system by logging into the coach's Robofest account. To confirm an email address change, the system will send the coach a confirmation email. The coach will need to confirm by clicking on a link in the confirmation email.
3. Robofest 2014 has multiple qualifying competition sites. A coach using a single coach ID may register different teams for multiple qualifying sites.
4. The coach is responsible for entering and updating team information by the update deadline **10** days before the competition. Note that team members' personalized certificates will be printed based on the information the coach enters on the website. Robofest will not reprint certificates for free due to incorrectly entered information.
5. Team coaches must coordinate pre- and post-assessments online to help Robofest administration gather data regarding students' learning of STEM subjects.

B. Coaching Teams

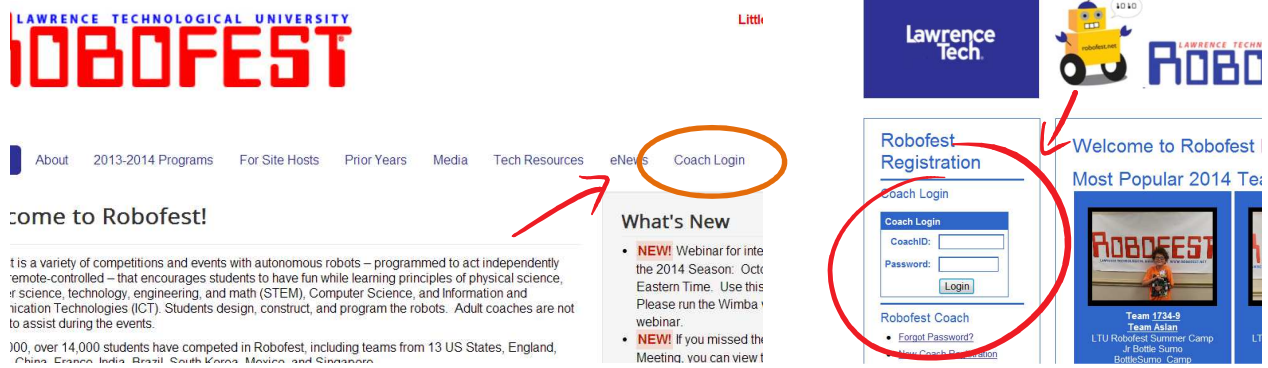
1. Coaches and adult volunteers must not directly work on their team's robot(s). They should teach and/or provide necessary training for the team to solve the challenge problems by themselves.
2. We recommend that coaches recruit technical mentors or assistant coaches if necessary. Coaches are encouraged to contact local IEEE (Institute of Electrical and Electronics Engineers) chapters (Robofest medal sponsor), ACM (Association for Computing Machinery) chapters, engineers' societies, robotics clubs, tech companies, or universities to find volunteer technical mentors.
3. Robofest provides some technical workshops at LTU and/or online. There are books, multimedia curriculum, and other online resources available as well.
4. The team coach is responsible for facilitating, transporting, and overseeing team members for team meetings and at Robofest competitions.

C. Sponsorships / Consent & Media Release Form

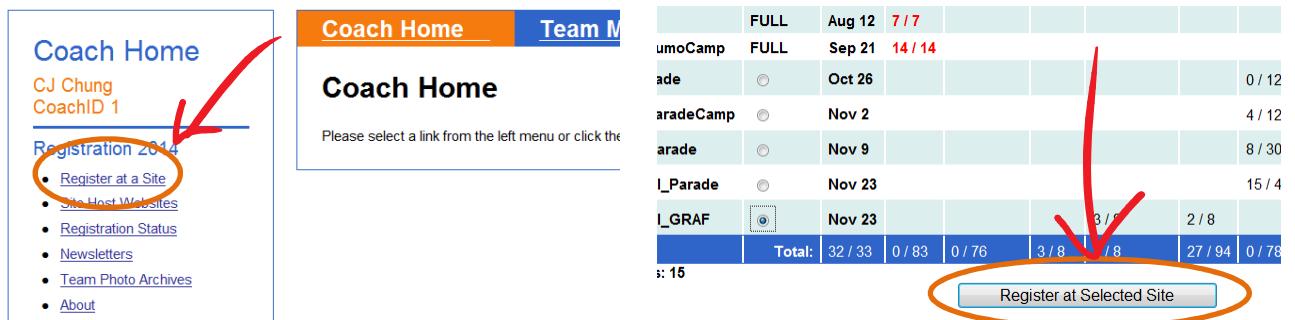
1. Another important role of the coach is to find sponsors for their team(s). Team sponsors are individuals, groups, companies or other organizations that donate cash, products, or in-kind services to the team. The Robofest website will list up to four team sponsors per team on the web.
2. Robofest attracts media attention. Coaches must collect *Consent & Release Forms* not only for students, but also for the coach him/herself and team volunteers. These paper forms must be submitted by a coach to the hosting site during check-in. Note that the form requires parent signature.
3. Before and after Robofest, please contact newspapers, radio, and TV stations to recognize your teams' efforts and achievements. Let Robofest administration (robofest@LTU.edu) know if your teams were featured in any media outlets.

3 Registration Process – Six Steps (See Figure 1 for summary)

Step 1. **Coach Registration** form can be found on the web at www.robofest.net. After the registration form is submitted, a coach ID and password will immediately be sent to the coach by email from do-not-reply@robofest.net. COACH REGISTRATION IS CONFIRMED BY CLICKING A LINK IN THE EMAIL CONFIRMATION SENT TO YOU. If you do not receive the confirmation email, contact robofestoffice@gmail.com or 248-204-3568 to resolve the problem. An incorrect email address in the coach registration form may be the cause. Please check your spam folder before contacting us. Veteran Robofest (2003 ~ 2013) coaches are encouraged to use their prior coach ID and password. If you forgot your password or ID, click on the "Forgot Password" link.



Step 2. **Team Registration** will begin in November 2013. Using the coach ID and password, the coach can create teams after selecting a qualifying site. During this step, the coach must accept the Robofest 2014 Coach's Pledge (Section 15).

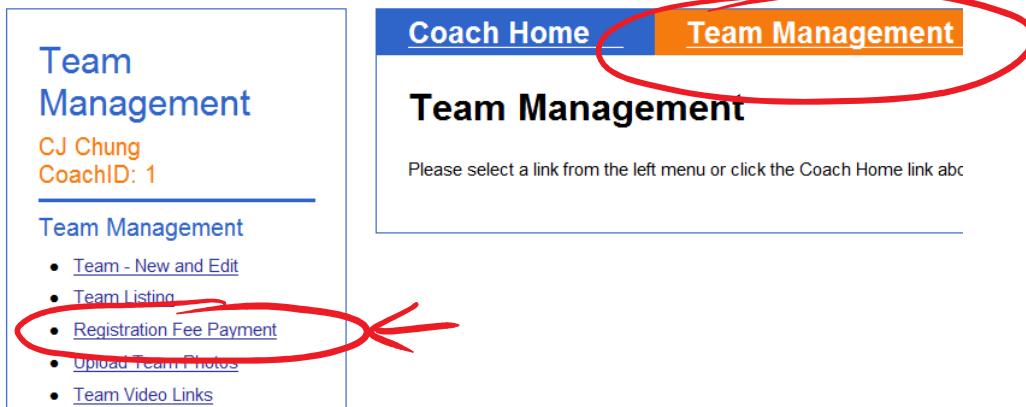


All the team member names, grades, and gender must be entered. Student contact information is not made public. Exhibition teams must enter a short project description in this step including the theme of the exhibition, functionalities of the robots, and any other information that describes the exhibition. Please register early, since a competition division of a site will be closed when the number of teams registered is equal to the maximum capacity for the division.

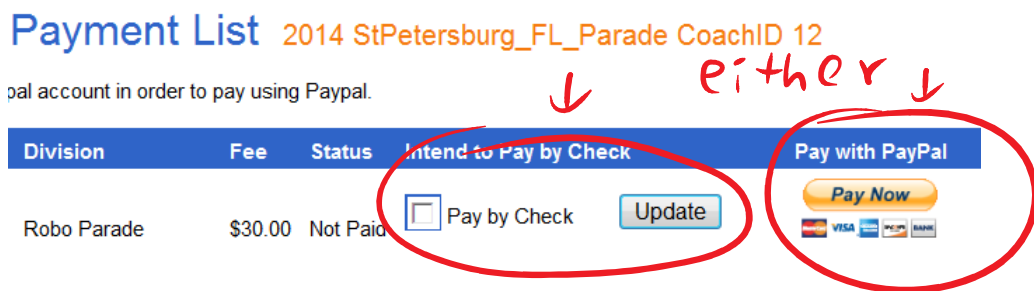


Submission button at the bottom!

Step 3. **Registration Fee Payment:** After creating all of your teams, pay the registration fee online using a major credit card through PayPal. A PayPal account is NOT required.



You will receive a payment confirmation email from PayPal, which can be used as a receipt. Or, you may choose the option to send a check payable to LTU Robofest to: **LTU Robofest, 21000 West 10 Mile Rd., Southfield, MI 48075, USA**. Make sure to **WRITE THE TEAM NUMBER(S) IN THE MEMO LINE OF THE CHECK AND INCLUDE A HARD COPY OF THE PAYMENT PAGE FROM THE WEB WHEN YOU MAIL THE CHECK**. Your team registration will be complete once LTU receives the check.



Step 4. **Consent & Release Form:** Print the Consent & Release form and send it to students' parents. Get the signed forms from parents.

Step 5. **Team Photo Uploading:** Take a team photo and upload it to the coach account on the web. Steps are: Logon to your coach account. Click on "Team Management" tab. "Upload team photos" link on the left menu bar. Select the site and team.

The requirements for the photos are: (1) standard **landscape picture** file such as jpg, gif or tif (width: height ratio should be 4:3 or 16:9) (2) smaller file size is recommended (3) must show all the team members listed (4) adult coach and volunteers may be in the picture (5) must show the identifiable team ID and team name (write down or print the number on a paper and hold it when taking the photo **or** edit the photo file to add text). The team ID number is decided in **Step 2** above. The photo must be uploaded within **3 weeks** after the team registration **and** 10 days before the qualifying date. **If no photo is uploaded before the deadline, certificates for the team will not have a team photo.** There will be special prizes for Best Team Photos. Please upload the team photo as early as possible, since the uploading date is one of the selection criteria for the award.

Step 6. **Robot Photo Uploading (Optional) & Final Update:** Take a photo showing your team robot(s), if your team wants. Upload the photo using the coach's web account **10 days before** your qualifying competition date. The robot photo requirements are the same as in (1), (2), and (5) in **Step 5** above. At this step, coaches must be sure to update any team information including team video links on the web. Best team videos will be selected during World Championship. The final update deadline will be **10 days** before the competition date for each qualifying site. This is a hard deadline, as time is needed to print and ship all the participant certificates to each site.

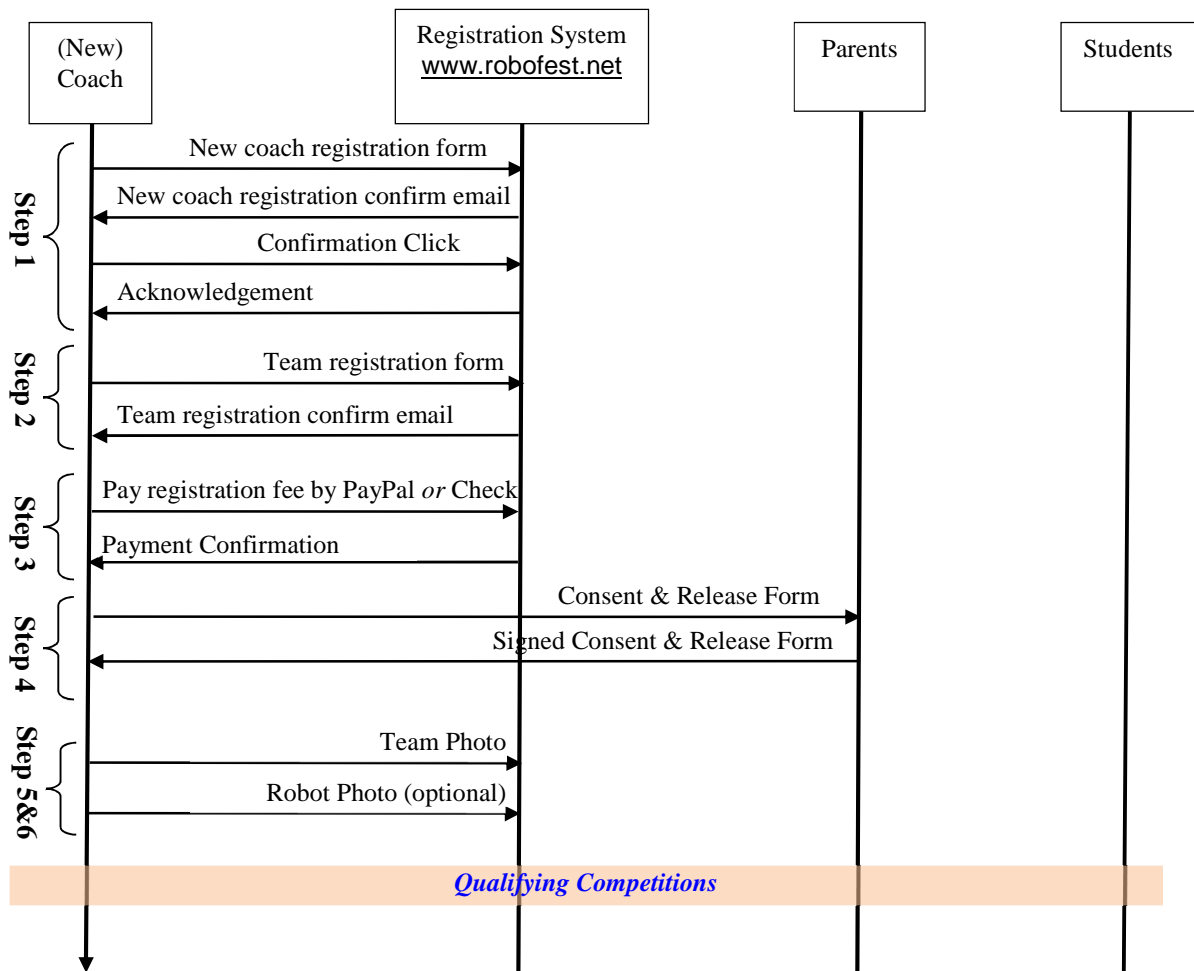


Figure 1. Team Registration Procedure Summary

4 Team Volunteers

The team cannot work without the help of various volunteers for technical mentoring, financial sponsorship, transportation, constructing playing fields, preparing food, taking pictures, videotaping, etc. The Robofest website will list up to five volunteers per team. LTU/Robofest has become a Certifying Organization for the President’s Volunteer Service Award, or PVSA (www.presidentialserviceawards.gov). All Robofest team and site volunteers are encouraged to track service hours. To register, please contact Robofest Coordinator, Faith Kurily at fkurily@LTU.edu.

5 Common Sense Rules for Education

Construction of the robot body as well as all programming for the student competition should be done solely by the students. Parents, teachers, mentors, or coaches may not directly assemble the robots or directly write the program code for the team at any time during the preparation period or during the competition. Any direct participation is a violation of the rules. The offending team will become ineligible for any awards.

Only team members with name badges will be allowed in the pit (team table) area during the competition. **No adults are allowed in the pit area for all competition categories.** If a team coach must enter the area, they must receive permission from one of the judging proctors. It is strongly suggested, for security purposes, that the coach have assistants watch the team table area, especially when the team is competing. The use of wireless communication by students in the pit area is prohibited.

6 Robofest Assessments

For the Robofest 2014 season, we will continue to assess the impact of robotics competitions in STEM education. The purpose of the assessment is to quantify and analyze students' interest in STEM subjects and improvements in STEM skills through Robofest. Competitions can drive students to work harder resulting in improved skills. We believe that students participating in robotics competitions will hone STEM skills and demonstrate skills they would not have gained outside of the competitions. To prove this, we need measurable data to quantify the students' experiences. We can use this data to highlight successes and determine areas of improvement. They will be assessed before and after the competition to see the level of improvement. Another group of students who did not participate in the competition will act as a control group and take the same pre- and post- assessments.

Pre-assessment instruction will be sent, tentatively in January, to coaches registered at a site. Coaches will receive post-assessment instruction in early April. This assessment is anonymous and results may be published in a journal on education research.

7 Team's Responsibilities on Robofest Competition Day

- All teams must observe the check-in time set by the site host organizer.
- Things to bring to the Robofest venue:
 - Robot(s) and spare parts
 - A laptop or other computer for each team to solve unknown factors or adjust to the lighting conditions. It is **not** recommended that teams share computers.
 - *Exhibition teams*: poster boards to introduce the exhibition including a description and all the necessary materials for the exhibition
 - A power strip and power cable
 - Extra batteries or charger
 - Signed Consent & Media Release forms for team members, coach, and team volunteers – *required*.
 - Check-in fee, if your qualifying site charges a check-in fee. Check out your site home page.
- Teams must use the team table assigned by the organizer. Please do not change team tables. If you change, judges and the organizer *will not be able to find your team*.
- General Rules During the Robofest Competition:
 - No food or drink is allowed inside the competition area.
 - Flash photography is not allowed inside the competition area.
 - Do not make unnecessary noise which might disturb other teams in the pit area. Be respectful of all teams.

8 Rules for Video Submission Entry for Qualifying

If there is no qualifying site near the team location (or under special circumstances) the teams may register on-line for Video Submission. There will be two separate categories – one for International, and one for US. Video Qualifier teams are required to pay the same registration fee. We will ship medals and certificates to teams.

Trophies will also be shipped to winning teams. The following are the suggested video contents:

- Start with the team ID/name and team member introduction, around 5 seconds for each member.
- Introduce features of the robots, around 5 seconds for each robot.
- Demonstrate Game or Exhibition. The video should not be edited once the demo has started. See Game rules as well as the submission form for details about how to prepare the video.
- 2 minute question and answer session. Questions can be made by the coach.
- Rolling credit and/or acknowledgement (recommended).

Adults may help produce the video. If students were involved in the video production work, it should be acknowledged in the credits. The coach must submit a signed *Robofest Video Submission Form* when sending the video. Preferred submission method is to send a video sharing site link as well as the submission form **by email** to Robofest@LTU.edu. A DVD may be sent to:

**LTU Robofest
21000 West 10 Mile Rd.
Southfield, MI 48075, USA.**

All the video submissions must be **received, not postmarked**, by the deadline, Fri. April 11, 2014, noon EDT.

9 Warm-up Competition

Warm up competition will be open to only registered teams and registered judges. It will not be open to the general public.

10 Judging and Prizes

Approximately 20% of the total number of teams at each Official Qualifying Competition site will win trophies to be presented during the award ceremony. Detailed judging rules are explained in each category's rules. Every registered team member will receive a certificate of achievement and a *personalized* medal during the award ceremony of the Qualifying Competition. All teams must stay for the closing ceremony.

11 Special Competition: Team Photo and Team Video Contest

The best team photos will be selected from the uploaded team photos. Every team is automatically entered once the team photo is uploaded. Selection criteria include team spirit, unity, harmony and uniqueness. In addition, we are checking if the number of students in the photo is the same as the number of students in the system. A deduction might be made if the team photo was uploaded more than **3 weeks** after the team was registered.

We are introducing a new Team Video Contest. Any team video link entered on the team coach account is automatically entered to the contest. The video length should be less than 10 minutes.

12 Michigan Championship

Winning teams from MI qualifying competitions will be invited to the Michigan Championship at Lawrence Technological University on May 3, 2014. The total number of teams advancing from each qualifying site/competition division will be decided in proportion to the number of teams registered at the site in each division.

13 Video Screening

Teams from Non-Michigan Qualifying competitions will advance to World Championships based on a Video Screening for Exhibition teams and Game Score for Game teams. Winning Exhibition teams must submit a video of their robot exhibition by April 18, 2014 by emailing video link to robofest@ltu.edu

14 World Championship

Top Game and Exhibition teams from MI Championships, International Qualifiers, and Video Screening advance to compete in the World Robofest Championship at Lawrence Technological University May 17, 2014. The total number of teams advancing from each qualifying site/competition division will be decided in proportion to the number of teams registered at the site in each division.

As part of World Championship there will be Open Competition categories on May 16, 2014. These are open to any team and registration will be taken on a first come, first served basis.



Figure 2. World Championship Advancement Structure

15 Robofest Scholarships

Team members of the top Senior Division teams at the World Robofest Championship in Game, Exhibition, and VCC will receive \$2,000 LTU annual renewable scholarships, only if they become LTU students. Any Robofest participants may apply for a LTU annual renewable scholarship. Please contact Dr. Chung at chung@LTU.edu for details.

16 Reordering Certificates and Trophies

Robofest is pleased to provide certificate re-printing services for a minimum charge. Also, winning teams can order multiple trophies or certificates of award with individual names on a fee basis through the Robofest office. Visit the *2014* link on the Robofest home page for details.

17 Robofest 2014 Coach's Pledge

As a Robofest coach, I have read and agree to abide by the Robofest 2014 rules (<http://www.robofest.net/2014/robofest14rules.pdf>) as they exist now and as may be set forth or amended during the Robofest season.

As a coach, I am responsible for communicating and enforcing the Robofest rules to team members, team volunteers, and others affiliated with my team.

I understand that any rule updates, guidelines, additional information, and announcements will be communicated to me primarily via emails and web updates. I am responsible for reading the information and I will relay it to all

the people affiliated with my team. If there are any changes in my email account, I will notify Robofest administrators and update my coach profile.

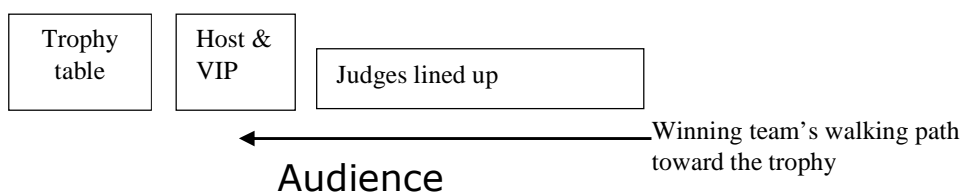
*As a Robofest Coach, I understand that the students come first. Robofest is about students learning S.T.E.M. Everything my team does starts and ends with the principle: **the students do all of the work**. My team members will do the designing, building, and programming of the robot. Adults may help them find the answers, but cannot give them the answers or make the decisions in detail.*

*Acceptance of this pledge signifies my intent to uphold and maintain the Robofest spirit. **This will be signed when coaches register teams on-line.***

16 Example Qualifying Competition Schedule

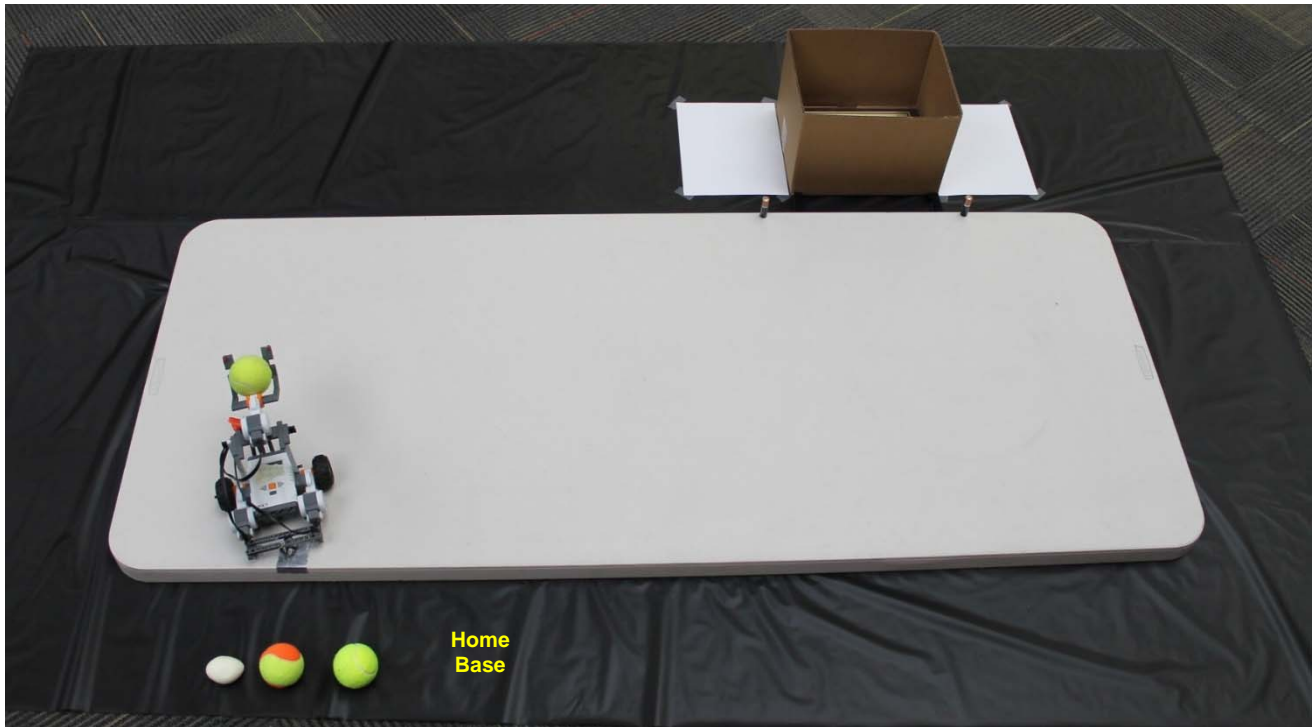
(Assumption: eight Jr. Game, six Sr. Game, and five Exhibition teams; plus **three** official Game playing fields. There is no official lunch time, but a food concession stand may be open.)

8:00am	Doors Open and Check-In begins. Find your team table after check-in. Both practice and official playing fields are open for practice. Setup Exhibitions.
9:00am	Opening Ceremonies <ul style="list-style-type: none"> • National Anthem • Opening Remarks • Introduction of Judges • Explanation of key Robofest competition rules
9:20 – 9:30am	Unveiling Unknown Factors (1) for the Game teams (No adult allowed in the pit from this point on)
9:30 – 10:00am	Official presentation and demonstration of Exhibitions (6 min x 5 = 30 min) Game teams work on unknown factors.
10:00am – Noon	Exhibition and silent judges will visit Exhibition team tables for interviews
10:00 – 10:05am	Game Robot Impounding
10:05 – 10:40am	Round 1 Jr/Sr Game competition begins on three Game playing fields in parallel. Teams compete in a pre-determined order set by the site host. Two or three teams will be timed and judged at the same time. Each round will be 7 minutes on average in length, which includes: <ul style="list-style-type: none"> • Move-in (2 min), • Team introductions (max 1 min), • Play (2 min), and • Move-out and return robot to impound area (2 min). With 14 Game teams, there will be five Round 1 competitions for a time of 5 x 7 = 35 minutes; 10 minute break.
10:45am	Unveiling Unknown Factors (2)
11:15 – 11:20am	Game Robot Impounding
11:20 – 11:45am	Round 2 Game competition begins in the order determined by the site host. There will be no team introductions, 5 x 5 = 25 minutes.
11:45am – Noon	Break. Judges tabulate final scores.
Noon	<ul style="list-style-type: none"> • Recognition of Coaches, Teams, and Team Members: Coaches will award Medals and Certificates of Achievement to students • Take a group photo with all coaches and team members. The group photo must be submitted to Robofest office for the official 2014 video. Playing music is recommended at this time.
12:15pm	Awards and Closing Ceremony: Judges should line up and congratulate winning teams. See the illustration below. Announce the teams that will advance to Regionals.
12:25pm	Recognition of Volunteers Volunteer Group Photo / Cleanup



Avoid Meltdown - Robofest® 2014 Game

V1.1 1-10-14 (Official Version)



[Figure 1] AvoidMeltdown playing field example (Jr. Division)

1. Mission Synopsis

A nuclear power plant is in trouble. An autonomous nuclear responder robot detected the problem and instantly delivers up to 3 water balls (tennis balls) and a special ball (hardboiled egg) into the plant (box) without human help in 2 minutes. The robot can carry only one ball at a time. Two concrete blocks (AA size batteries) near the plant need to be removed off the table. Also, the volume of the box (outer dimension) should be reported in cubic centimeters at the end of the Game.

For Jr. Division, the height and depth of the box will be given. The box is aligned in parallel with the table. For Sr. Division, only the depth of box will be given. The box is *not* aligned in parallel with the table.

Additional unknown tasks may be given for the World Championship, but not for qualifiers.

Learning Objectives of this challenge are motion, navigation, manipulation, object detection, localization, logic, ratio, proportion, math operations, measuring, and geometry.

2. How to Play and Score the Game

Each team is given 2 rounds, 2 minutes per round. For each Jr. & Sr. age division round, the playing field configuration including box size may be different for each round. Each team can have up to 7 team members.

Teams will be given 30 minutes after the unknown factors (see Tables 1 & 2) are unveiled. All teams must submit their robot with a visible team ID tag to the restricted impound area when the 30 minutes have expired. The *expanded* size of the robot will be checked when the robot is impounded (see later section for details). Manual configuration changes made to the robot during the round must meet the specific initial size requirement. No team is allowed to download new programs for the round after impounding.

After impounding the robots, the judges will re-setup the tables. Note that the rest of the playing field's information / dimension is completely unknown and will not be announced at all.

To start, a Judge (or Emcee) will specify which way (starting orientation) the robot will face, within the range of 10 to 2 o'clock direction from the perspective of the player. The robot must be placed in the Home Base area as long as part of it is on *or* over the foil tape base and meets the initial size requirements; it may hang over the edges of the table. Players may pick up and modify (add and/or remove parts) their robot without penalty only when any part of the robot is on *or* over the Home Base (foil tape). Human players are to put the balls and egg into/onto their robots.

If any part of the robot is touched outside of Home Base by a player after the game has started, it must be restarted from Home Base in starting orientation and a penalty will be given. When a penalty occurs, the Judge will show a Red Card. No more than two penalties in total may be assigned per round. When restarting by human players, the orientation of the robot must be the same direction as when the game started (starting orientation), and the team may (1) start without reset *OR* (2) request reset of the box. Whenever the box is reset, a penalty is given. If a human player touches or moves the ball or egg when not at Home Base, it is also regarded as a violation.

See the scoring sheet at the end of this document for detailed point and penalty values. Each team must return the robot to the impound area at the end of the round and it must remain there until the next unveiling and prep time. During this time, teams are encouraged to talk with other teams to see what they have learned and accomplished.

3. How to set up playing fields

The playing field is a 30" x 72" (actual width is 75.5cm) plastic folding table that can be purchased at discount stores like Lowes, Kmart, or Sam's Club. The surface is light in color such as almond; however, the exact color and brightness is unknown until the competition day. The four corners of the table are rounded. The thickness of the table is about 4.5 cm.

Figure 1 shows a possible playing field configuration for Jr. Division. The table should be placed on a dark colored floor with the legs folded under. For each competition site, all the tables including practice tables should be identical. Especially the thickness of the tables should be the same.

The box is located opposite side of the Home Base. Any box can be used and the color of the box is unknown. The thickness of the box material is unknown. Inside the box, a hard material like a plaque will be placed as shown in Figure 1 so that the egg can be broken if dropped without care. Box size requirements are specified in section 3.1.

One 4.8cm x 4.8cm aluminum foil tape square will be placed at an unknown location along the *longer* edge of the table as the Home Base (Home). The location of Home is not too close to the corner of the table.

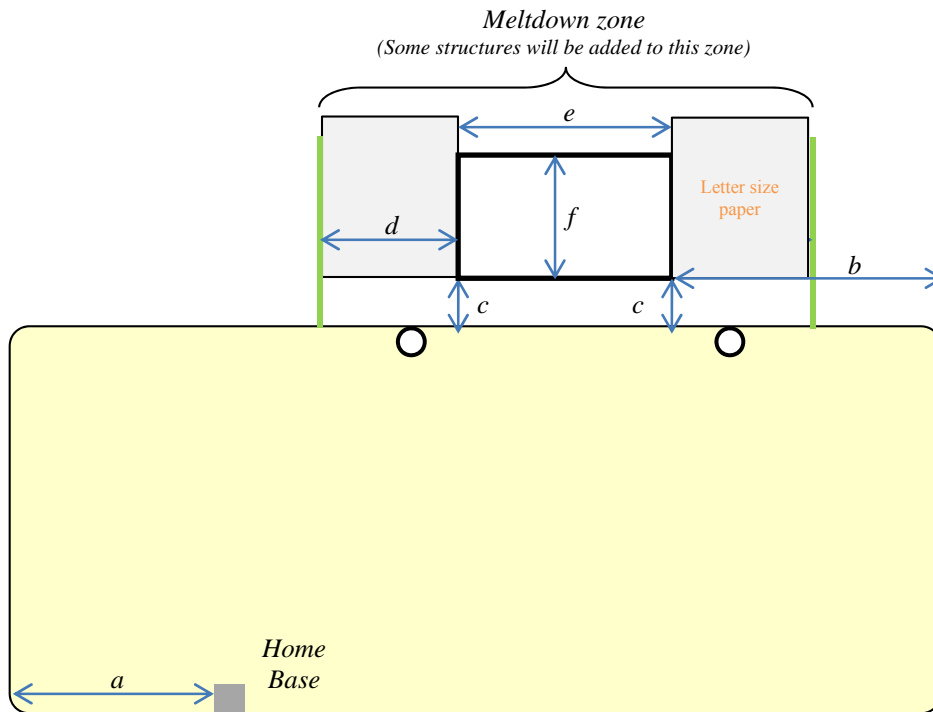
Two concrete blocks (AA size batteries) will always be located within the meltdown zone. Unlike previous Robofest Games, tennis balls are not wrapped with foil tape.

3.1 Jr. Division Playing Field

Table 1 lists parameters for the Jr. playing field shown in Figure 2. Table thickness is not critical for Jr. Game.

	min	max	Unveiled?
<i>a</i>	25cm	40cm	No
<i>b</i>	30cm	50cm	No
<i>c (fixed)</i>	8cm (10 Lego size)	8cm	Already known
<i>d (fixed)</i>	21.6cm (shorter side of letter size paper)	21.6cm	Already known
<i>e</i>	20cm	50cm	No
<i>f</i>	20cm	50cm	Yes
<i>Height of the box</i>	15cm	50cm	Yes

[Table 1] Jr. playing field parameters



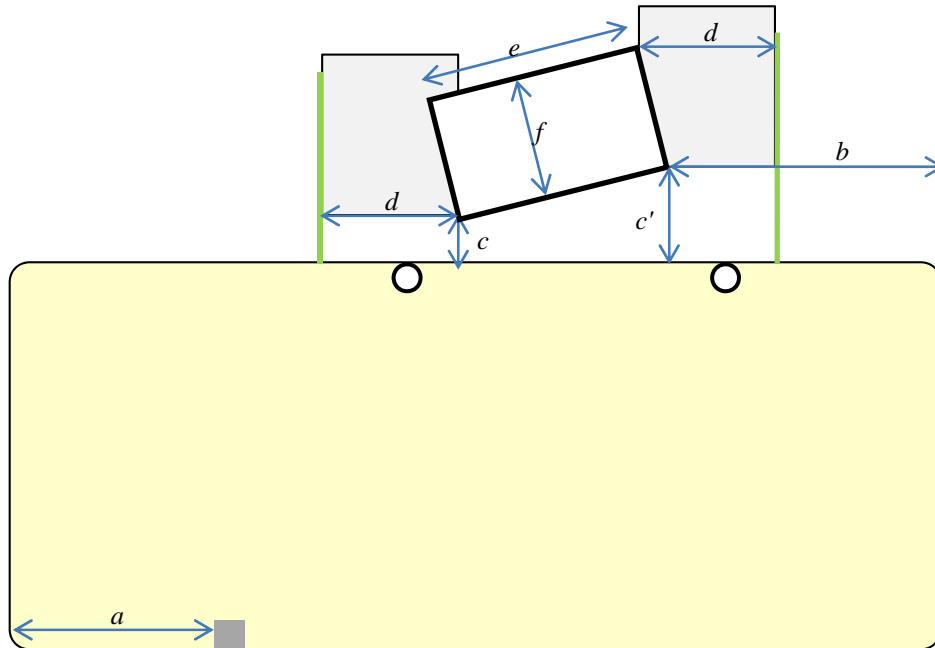
[Figure 2] Jr. playing field diagram

3.2 Sr. Division Playing Field

Table 2 lists parameters for the Sr. playing field shown in Figure 3.

	min	max	Unveiled?
<i>a</i>	25cm	40cm	No
<i>b</i>	30cm	50cm	No
<i>c (fixed)</i>	8cm (10 Lego size)	8cm	Already known
<i>d (fixed)</i>	21.6cm (shorter side of letter size paper)	21.6cm	Already known
<i>e</i>	20cm	50cm	No
<i>f</i>	20cm	50cm	Yes
<i>Height of the box</i>	15cm	50cm	No
<i>c'</i>	(c+3) cm	(c+10) cm	No
<i>Table thickness</i>	4cm	5cm	Yes

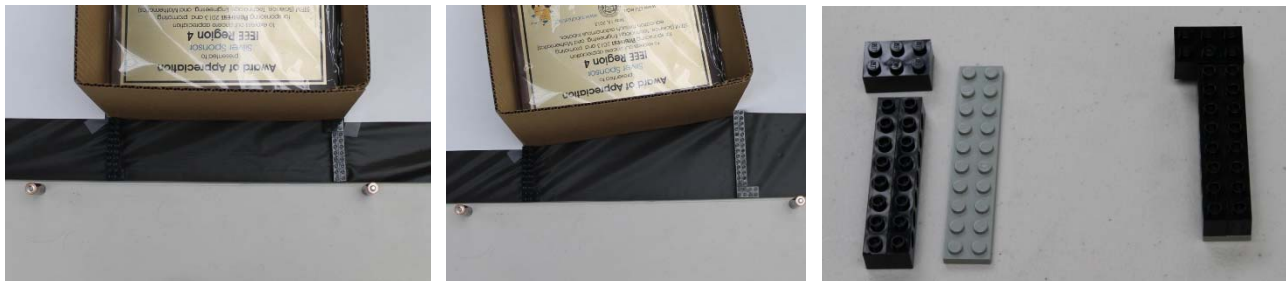
[Table 2] Sr. playing field parameters



[Figure 3] Sr. playing field diagram

3.3 How to set-up the box

Between the table and the box, two simple Lego structures will be placed as shown in Figure 4. The structure is a part of the playing field. Note the height of the structure is about 2cm. Color is unknown.



[Figure 4] Lego structures (Jr & Sr) between the box and the table.

Right most picture shows pieces for sample Jr. structures. Actual structure might be different.

4. Robot Specifications (For both Jr. and Sr. Division)

- Initial maximum width and length is 35cm x 35cm (the robot may expand automatically after starting. The size is always checked when starting at the Home Base)
- Expansion is allowed. But the max size cannot be bigger than 70 cm. Note that 75.5 cm is the width of the table.
- Height and weight limitation: none
- Any number of sensors/sensor types (unless it is harmful to humans)
- Any number/type of motors/servo motors (multiplexor is OK to use)
- Any material/robot kit may be used to construct your robot including tape, glue, bolts and nuts, rubber bands, etc.
- Team ID tag on top of the robot is required.
- Number of controllers (brains): see Table 3 below.

5. Sr. Division Details

The difference between Jr. and Sr. Division challenges are summarized in Table 3.

	Jr. Division	Sr. Division
Grades	5~8th	9~12th
Box orientation	Parallel to the table	Not parallel to the table
Math skills	trigonometry not required	trigonometry may be required
Number of controllers (programmable main brain)	One	No limit
Recommended Programming Language	GUI based (Visual programming) language	C or Java

[Table 3] Jr. and Sr. Division differences

6. Rules to Play Rounds and Determine Winners

The Emcee shall announce the following before each round: *No adult is allowed in the pit area from now through the end of the round. None can come in and out during the 30 min. The use of any communications devices to remotely control robots or communicate with players is prohibited in this competition arena. If anyone sees any suspicious activities, please notify the nearest volunteer immediately. Only two team members can stay in the competition area.*

Teams will compete in a pre-determined order decided by the site host. The Emcee will briefly introduce teams to the audience.

Winners in each division will be decided by the **average** Final Score of the 2 rounds. Tie breakers will be: (1) best Final Score of two rounds, (2) rerun, if needed.

7. Special Notes

- *Though every effort is made to be consistent and precise, in all of the dimensions of the playing field and parts, Robofest assumes some error of up to plus / minus 0.2cm. Robofest encourages feedback loop control using landmarks, not dead reckoning. Final decisions are at the discretion of the Chief Game Judge.*
- If there are multiple playing fields at the competition sites, the Chief Game Judge will check consistency between the playing fields.
- When the robot is searching for the box using distance sensor(s), Judges should maintain at least 4 feet distance from the table.

8. FAQs (Please check for possible additional FAQs at www.robofest.net → 2013-2014 Programs → Game)

- *Can the egg be in a package and the package can be dropped into the box?* Yes. (Package design should be ready and easy to put on if required. Any package application is part of 2 minute time. Egg removal and checking time by Judges is not part of 2 minute time.)
- *Does the robot need to come back Home by itself at the end?* No.
- *Can teams adjust the height of the robot after the box information is unveiled?* Yes. Teams may need to bring additional parts.
- *Is there a required sequence of missions?* No.
- *Can we ask for a reset of the box when the robot is in action?* No, only when the robot is at the Home Base.
- *Can we ask for a box reset without penalty when the robot is over Home Base?* No. A Red Card is given, whenever the box is reset, if the maximum red cards have not already been given.
- *I grabbed my robot. Can I restart my robot without the box reset?* Yes.

- *Must the robot stop at Home Base?* No. But it is desirable to make it stop. A player may pick it up at the Home Base without penalty.
- *Do the Judges stop the clock to reset the box?* No.
- *Can a robot still display the volume after the 2 minute time runs out?* Yes, without any penalties.
- *Can a player reset the box?* No. It must be done only by Judges. Remember: you will be asked to restart if you touch the box. A penalty will be assessed.
- *Robot came back Home on its own and the human player did not touch the robot when loading the ball and restarting. Must the robot use the same starting orientation?* No.
- *Are teams permitted to have multiple programs?* Yes.
- *Are the size and weight of the egg known?* No.
- *Can teams package the egg before the start of the game?* No. Only during the 2 minutes.
- *Can teams use a tool to precisely measure the starting angle?* No.

9. Bill of Materials (BOM) to Construct a Playing Field

	Est. Unit Cost	Quantity	Cost
30" x 72" Folding Table; Suggested tables can be found at: www.buylifetime.com/Products/BLT/PID-22901.aspx ; Almond color; Folding tables will be re-used in future Robofest games. Note that the thickness of the table is about 4.5cm.	\$50 (at Lowe's)	1	\$50
Tennis ball	\$1	3	\$3
Hardboiled egg	\$.5	1	\$.5
White letter-size paper for the effective zone (Reuse scratch paper)			N/A
Aluminum foil tape at Home Depot or Lowes	\$7	1	\$7
LEGO Blocks			
(Used) AA battery		2	N/A
Total			\$60.50

10. Change logs

(From v0.42 10-23-13 to this version)

- Section 1, cubic millimeters at the Home Base -> cubic centimeters at the end of the Game (Score sheet also revised accordingly)
- Section 3.2, Table 2 updated
- Section 3.3, Figure 4. Lego structures shown are samples. Actual structure might be different
- Score sheet: final score calculation formula has changed

(From v1.0 12-3-13 to this official version)

- Figure 1, 2, 3, and 4 with letter size papers. Only white papers will be used.
- Figure 4, rightmost picture. The color of the outer block will be black

Robofest 2014 Game AMD Scoring Sheet (v1.0)

Division: Junior / Senior

Team Name: _____

Team School / Organization Name: _____ Team Number: _____

Round: First Second Track No.: _____

Judging Items (<i>checked at the end of a game round</i>)		Count	Point Value (per count)	Score Earned / Lost
Water Ball	Not in the box, but it was touching the meltdown zone when dropped	0 1 2 3	5	
	Inside the box	0 1 2 3	15	<small>Max. 45</small>
Egg	Inside the box (not broken)	0 (no) 1 (yes)	20	<small>Max. 20</small>
	Inside the box (broken)	0 (no) 1 (yes)	10	
	Not in the box, but it was touching the meltdown zone when dropped (not broken)	0 (no) 1 (yes)	10	
	Not in the box, but it was touching the meltdown zone when dropped (broken)	0 (no) 1 (yes)	5	
Blocks	Off the table	0 1 2	5	<small>Max. 10</small>
The robot measured the volume of the power plant, and reported the volume _____ (Measured Value) in cm ³ at the end of the Game.		0 (no) 1 (yes)	20	<small>Max. 20</small>
The robot remained intact throughout Game.		0 (no) 1 (yes)	5	<small>Max. 5</small>
Number of Red Cards that were given when a human player touched the robot, playing field, or the plant was reset		0 1 2	-2	<small>Max. 0</small>
** If Measured Value was "blank", Final Score is Total Score. If Measured Value is a number, calculate $e = \frac{ CorrectValue - MeasuredValue }{CorrectValue}$		Total Score Max. possible is 100		Final Score ** Calculated by Scorekeeper using Excel. Not to be rounded.
$Final\ Score = \begin{cases} Total\ Score - 17 & \text{if } e \geq 1.0 \\ Total\ Score - 15 * trunc(e, 2) & \text{otherwise} \end{cases}$				

Truncation function **trunc(e,2)** means 2 decimal places will be left after truncation, i.e. errors under 1% will be ignored.

Judge initials: _____

Team player initials: _____

Robofest 2014 Exhibition Competition Rules

The robotics Exhibition is a great way for students to show off their imagination, innovation and creativity. Each team has complete freedom to create interactive and intelligent robotics projects such as robot pets, robots for scientific experiments, and practical robotics applications. Teams are composed of one to seven members. In general, two or three students are recommended per robot. Computer controlled robots may be of any size and can use any material as long as it is safe for humans. Even if human controlled hard-wired remotes are not allowed, *unlike the Game*, wireless (host) computer program control is allowed for Exhibition, if the program is written by students. Robot-to-robot as well as human-to-robot interactions are strongly encouraged. Sensors must be employed to assure the robot is interacting with its environment.

Please go to www.robofest.net and click on the [Prior Years](#) link to view Exhibition projects from previous years. There is no suggested theme for 2014 year. However, projects related to arts such as robot painters, dancing robots, storytelling with robots, musical robots, fashion show robots are recommended to participate in the GRAF (Global Robotics Art Festival) to be held in the fall season. Projects which have been entered in a previous competition category of any kind must adhere to the following "continuing project" guidelines:

Continuing Project Guidelines: Teams with continuing projects must:

- Add new features and/or significantly improve or change one or more features
- Describe the addition and changes in the project description text area of the online team registration form
- During the official presentation, inform judges that their project is a "continued" form of a previous project

On the day of the Robofest competition, each Exhibition team will be given a 6ft or 8ft long table on which to demonstrate the robots. After the opening ceremony, teams will have maximum **4** minutes to explain and demonstrate their robotics project to the public, possibly using a wireless microphone. Judges will visit the team table to ask additional questions and inspect program code any time before the final judging. "Silent Judges" may visit teams throughout the day to ask questions, check displays and observe interactions with spectators. These judges will not identify their roles.

Teams must bring all the necessary materials for the Exhibition. For example, if the Exhibition needs background music, the team must bring the music file. The sound system in the hosting site may not be available to play your music. Therefore, it is highly recommended to contact the site host in advance and/or bring music player/portable speakers, too. Teams are requested to bring poster boards to describe their projects. Hardcopies of team project documents to give to the judges are a plus, but not required.

We highly recommend each Exhibition team setup a team website and/or publish a video clip on a video sharing site such as YouTube. Judges will use this to preview the team projects and the team will get better scores for the presentation methods category. Teams should plan to show their video to the Judges in case they did not have an opportunity to view the video prior to the competition. The Exhibition team coach can update the online information and the URL using his/her Robofest account.

The judging will be done by using the rubric attached.

The application of math and science theories that are appropriate to the team members' age level is a strong plus for judging. Even though the use of advanced level skills is fine to use, it may not give any advantage for the judging.

Spectators will decide People's Choice Awards during North American Championship and World Championship. Only one vote per person is allowed.

Robofest Exhibition Judging Rubric

Team Name:

Team ID:

Division (circle one): Jr. Sr.

Judge Name:

Brief project description:

(*) Judging Score

5: Strongly agree - excellent, advanced, exemplary, or amazing

4: Agree - good, accomplished, or proficient

3: Neutral - average, intermediate level, or acceptable

2: Somewhat disagree - attempted but needs work

1: Disagree - little attempted or needs lots of help



1 ~ 5

Judging Category	Sub Categories	Weight	Score*
1. Math & Science learning	This project truly applies the concepts of math and science	8%	
	Students have sound and rigorous knowledge of the math and science concepts they applied.	8%	
2. Project idea and originality	The project idea was wow!	6%	
	I asked the team whether similar projects exist. The project itself is unique or has creative and original components. If project was entered in previous competition, it has significantly different/new features.	6%	
3. Project demo performance (robot)	The official public robot demo was free from problems and very impressive.	10%	
4. Project presentation (humans)	Project presentation was clear, well organized, and delivered effectively. Student attitude toward spectators was courteous. Students reacted professionally when the robot did not perform as expected.	8%	
	Information on the team poster, brochure was clear, well designed, and able to be understood even by robotic novices.	2%	
	The team provided information on the web such as a team website OR YouTube video.	2%	
5. Team work	Specific member roles were clearly introduced. Work division is done well and balanced. Each team member seems to know as much as the other team member. Teamwork and team spirit was evident. Shows respect to other teams. Good citizenship.	8%	
6. Robot design	I inspected and tested the robot. The robot mechanical design was creative, user-friendly, and sturdy.	7%	
	New, unique, innovative technologies/tools/parts/materials were introduced and used	3%	
7. Project size	The project is complex (not simple) and not small.	7%	
8. Practicality	The project shows practical & useful problem solving skills that have the potential to culminate in a useful robotics project. Students had entrepreneurial ideas and mindset as well.	7%	
9. Programming	I asked students who were involved in programming to explain a part of the programming code. They totally understood the code and seemed like they wrote the program. The code is well organized and commented.	8%	
10. Team independence	I believe the project was mostly done by students, not by adult coaches, parents, or mentors.	10%	

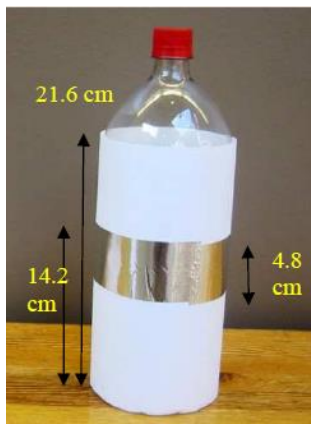
100%

Robofest 2014 BottleSumo

1-29-14, V2.0



(Figure 1) An example of BottleSumo Game Initial Configuration



(Figure 2) Bottle Dimensions



(Figure 3) Table Setup

1. Game Objective and Synopsis

The objective of the game is to **EITHER** be the first robot to find and *intentionally** push a 2 liter bottle (filled with 1 liter of water – see Figure 2) off the table **OR** be the last robot remaining on the table. In either case, after the event (either the bottle was pushed off or the opponent is off the table) the robot must survive on the table at least 3 seconds**. A robot is considered off the table *when any of its parts are touching the floor*, whether it was pushed off the table by the other robot or it fell off the table on its own.

(*) The game continues without the Bottle like head-to-head sumo wrestling:

- When it is not clear which robot pushed the bottle off the table.
- When the bottle was dropped off by accident (unintentionally). Examples are:
 - A robot does not have any sensor in the rear and the bottle is pushed off while backing up.

- A robot does not have any sensor on the side and the bottle is pushed off while spinning.
- The bottle is pushed off the table as a result of one robot pushing the opponent robot.

(**) If the robot that pushed off the bottle does not survive for 3 seconds, then the opponent has a chance to win. If the robot that pushed off the opponent does not survive for 3 seconds, then the game becomes tie.

How to start the game (the way to start the robot to move) is unveiled 30 minutes before impounding robots – *An example: a robot must wait 5 seconds after the game is started and the bottle will be placed, approximately the same distance from each robot, during the wait time by a Judge.*

Starting location, starting orientation, and location of the bottle will be unveiled after impounding before starting the first match.

Each robot must be fully autonomous. **No** human control, signal, or remote computer control (teleoperation) is allowed.

2. Age Divisions and Competitions

This BottleSumo game in 2014 is only for Junior (Grades 5-8) Division teams. Another similar game, BottleZone is for Senior (Grades 9-12) teams.

3. Team Size

Maximum three members per team

4. Robot Requirements

Teams must construct the robot before the competition day. Teams are required to bring laptop computers to adjust their programs since lighting condition, floor color, and table color, etc. are unknown until the competition day. The following table shows details about robot specifications.

Maximum robot mass	1 Kg
Robot kit	Any
Maximum robot width, length, and height	25cm Robots may *NOT* expand their dimensions during the game.
Number of robot controllers per robot	One controller only
Traditional sensor types	Any unless it can be harmful to humans.
On-board vision sensor system	Not allowed
Number of sensors	Any
Motor types	Any
Number of motors	Maximum 3
Wheels or legs	Either
Material	Any. You may use tape, glue, rubber bands, etc. (However, you cannot glue/tape the robot to the sumo ring floor.) Vacuum or sticky tires are not allowed.
Programming language	Any

5. Game Playing Field

One 76.2cm x 182.9cm (30" x 72") plastic folding table (such as those found at <http://www.buylifetime.com/Products/BLT/PID-22901.aspx>) is used for the ring (See Figures 1 and 3). The surface is light in color (almond or tan), but the exact color is unknown until the competition day. The table is placed on a dark colored floor with the legs folded under. The table is raised up at least 5cm as shown in Figure 3.

6. Competition Procedures

- 1) Right after opening ceremonies, how to start the robot is unveiled. 30 minute timer will start. No adult help is allowed at this time.
- 2) After the 30 minutes, all the robots are impounded. At that time, size and weight will be checked. Judges will also inspect the robot for any illegal materials.
- 3) **Time Trials:** Using the same configuration with 2 bottles and starting location/orientation, Judge will measure the time taken to push the two bottles off the table. Max time given is 2 minutes. If the robot itself falls off the table, 2 minutes 1 second will be recorded. Special prizes may be awarded based on this Time Trial result.
- 4) After the Time Trial, each robot must be impounded again.
- 5) After the Time Trial of all the robots, judges will allow teams to take the robots back to the team table to fix any problems for around 10 minutes. During this time, robots will be ranked based on the time taken. Using the rank, Single Elimination Seeded Tournament Brackets will be made.
- 6) Before starting matches, all the robots must be impounded again. Size and weight must be checked again.

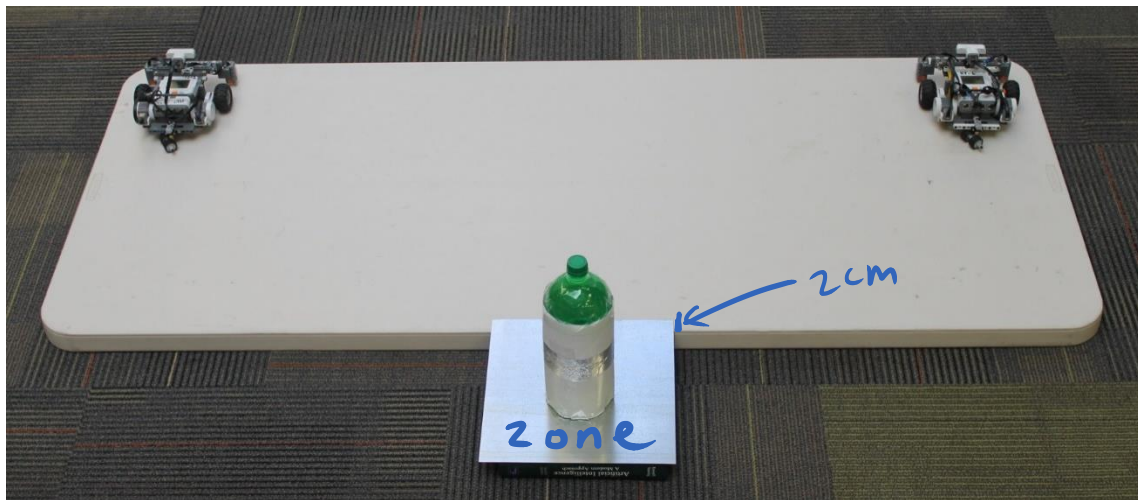
7. Game Match Rules

1. A match consists of up to three games. At the start of each game, the judge will announce (1) the location of the robots on the table and (2) the orientation of the robots (see Figure 1).
2. Immediately after the judge gives the signal to start the game, *each robot must satisfy the starting requirement mentioned in section 1* and everyone must move at least 72" away from the table and may not approach the table until after the end of the game.
3. If the robot violates the starting requirements, the robot automatically loses the game.
4. Again, if the bottle is dropped off the table unintentionally (by chance), judge continues the game.
5. A maximum of 2 minutes are given for each game. At the judge's discretion, the judge may choose to declare a tie game if:
 - Both robots at the same moment touch the space outside the table.
 - It is not clear which robot fell off the table first.
 - NO progress has been made in a reasonable period of time.
 - The robots fail to touch each other for a reasonable period of time.
 - The robots are hopelessly entangled or otherwise deadlocked.
 - BOTH robots fail to start.
 - There is no winner after two minutes.

The Judge has all the discretion in making ANY-and-ALL final decisions for the cases not considered in these rules.

Robofest BottleZone 2014

V2.11 1-29-14



(Figure 1)

Game Rules

1. The objective of the game is to push the opponent off the table **and** occupy the shiny zone. If this “**and**” condition is not met within 2 minutes, the game is a tie.
2. A robot is off the table when any part of it touches the floor, even if that part is no longer connected to the main body of the robot.
3. Successful occupation means every part (except wires) of the robot must be inside the zone for the full three seconds.
4. How to start the game (the way to start the robot) is unveiled 30 minutes before impounding robots – Example: a robot must wait 5 seconds after the game is started.
5. Starting location, starting orientation, and exact location of the bottle zone is unveiled after the impounding before starting the first match.

Age Division: Senior (9th ~ 12th grade) is recommended. See BottleSumo rules for Junior division teams.

Team Size: maximum 2 members per team

Robot Requirements

Each robot must be fully autonomous. **No** human control, signal, or remote computer control (tele-operation) is allowed. Teams must construct the robot before the competition day. Teams are required to bring laptop computers to adjust their programs since the starting methods, lighting condition, floor color, and table color, etc. are unknown until the competition day. The following table shows details about robot specifications.

Maximum robot mass	1 Kg
Robot kit	Any

Maximum robot width, length, and height	25cm Robots may *NOT* expand their dimensions during the game.
Number of robot controllers per robot	No limit
Traditional sensor types	Any unless it can be harmful to humans.
On-board vision sensor system	Allowed
Number of sensors	Any
Motor types	Any
Number of motors	Maximum 3
Wheels or legs	Either
Material	Any. You may use tape, glue, rubber bands, etc. (However, you cannot glue/tape the robot to the sumo ring floor.) Vacuum or sticky tires are not allowed.
Programming language	Any

Playing Field

1. One 30" x 72" plastic folding table (such as those found at <http://www.buylifetime.com/Products/BLT/PID-22901.aspx>) is used for the ring (See Figure 1). The surface is light in color (almond or tan), but the exact color is unknown until the competition day. The table is placed on a dark colored floor with the legs folded under.
2. A 2 liter bottle covered with white paper and filled with 1 liter water is placed on approximately the center of the zone to make it easy for robots to find the zone.
3. The zone will be made of 12"x12" steel sheet. (For example: <http://www.homedepot.com/p/MD-Building-Products-1-ft-x-2-ft-28-Gauge-Steel-Galvanized-Sheet-56020/100282523>) It will be placed on material of which height is the same as that of the table. Note that the overlapping area is 2cm. See the picture above. The panel is taped on the table with transparent packaging tape.

Competition Procedures

1. Right after opening ceremonies, how to start the robot is unveiled.
2. After 30 minutes, all the robots are impounded. At that time, size and weight will be checked. Judges will also inspect the robot for any illegal materials.
3. **Time Trial:** Judge will announce the location of a bottle (instead of the opponent robot) and the starting location and orientation of the robot. Judge will measure the time taken to push one bottle off the table and occupy the zone. Max time given is 2 minutes. If the robot does not accomplish the whole mission, 2 minute 1 second will be recorded. Robots will be ranked based on the time taken. Special prizes may be awarded based on this Time Trial result. Teams must return the robot to the impounding area after this time trial.
4. After the Time Trial of all the robots, Judge may allow teams to take the robots back to team tables to fix problems for 10 minutes. During this time, using the rank, Single Elimination Seeded Tournament Brackets will be made.

Matching Rules

1. A match consists of up to three games. At the start of each game, the judge will announce (1) the location of the robots on the table and (2) the orientation of the robots (see Figure 1).
2. Immediately after the judge gives the signal to start the game, each robot must satisfy the starting requirements as defined "Game Rules 4" and everyone must move at least 72" away from the table and may not approach the table until after the end of the game.
3. If the robot violates the starting requirements, the robot automatically loses the game.
4. The robot is supposed to stay on the table, even if it detects objects outside table such as Judge.
5. If a robot is off the table, the judge will move it away from the table.
6. A maximum of 2 minutes are given for each game. At the judge's discretion, the judge will declare a tie game if:
 - There is no winner that accomplishes "Game Rules 1" after two minutes.
 - NO progress has been made in a reasonable period of time.
 - The robots are hopelessly entangled or otherwise deadlocked.
 - BOTH robots fail to legal-start.
7. How to decide the Match winner. The team that wins 2 games first is the winner of the match. Tie breakers are: (1) Time trial ranking, then (2) additional games.
8. The Judge has all the discretion in making ANY-and-ALL final decisions for the cases not considered in these rules.

FAQ

- In order to successfully occupy the zone, must the robot push the bottle off the zone? No. Your robot can be small.
- Can we use camera sensors? Yes
- The zone can be completely on the table like the Robofest 2007 game, RoboZone? No.

Robofest Vision Centric Challenge (VCC) 2014

A Robofest (www.robofest.net) Challenge for Advanced High School and College Students
Lawrence Technological University, Southfield, Michigan

V2.0 1-23-14

In order to promote research on computer vision and autonomous mobile robotics, we challenge college students (undergraduate and graduate students), as well as talented high school students with the following Vision-based Robot Competition during Robofest 2013-2014 academic year.

Team Divisions

- College Division: max. 2 members per team, digit recognition required
- Advanced High School Division: max. 3 team members without digit recognition

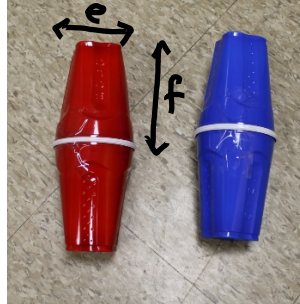
Challenge Synopsis: Colored Cup Navigation

1. A judge will show either figure 1 or 2 to the robot camera. Then as an acknowledgement the robot is required to spin one round (at least 270 degrees).
2. A judge will give a digit number printed on white paper as shown in figure 3 to a team member. Team member is to show it to the robot in any way (angle and distance). Then the robot is supposed to spin one round again.
3. Now robot perceived all the information to perform the navigation mission. Timer begins now. If figure 1 was shown (Blue cup left) then the robot should navigate through the path in such a way that blue cups are always on the left side.
4. Since the number given was 2, the robot needs to return back home at the 3rd yellow cross-line while maintaining the left blue color rule.

The whole scenario is shown in figure 4. 3 minutes are given for each run after showing the digit.



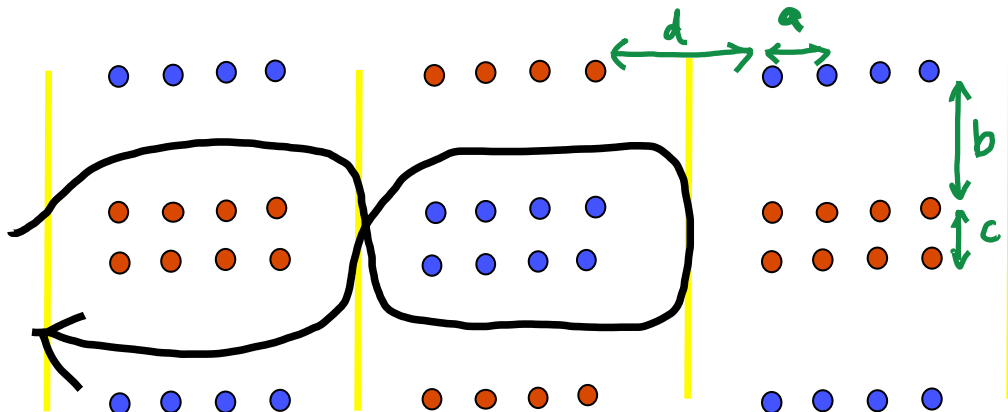
(Figure 1) Blue Cup Left



(Figure 2) Red Cup Left



(Figure 3) Digit 2



(Figure 4) A sample course with 3 groups of cups. Figure 1 and 3 were shown to start

Challenge Course Description

The color of the floor is unknown, but will not be blue, red, or yellow. Number of yellow lines that divides each cup group is unknown. The light condition on the course is unknown and may be dynamic. Table 1 shows course landmark dimension ranges. The yellow line is made of duct tape of which the width is at least 2.5 inches. The exact color of the cups are unknown. The digit number on a white letter size (8.5"x11") paper can be downloaded from the VCC home page at www.robofest.net/collegiate. The orientation of the sign must be portrait.

a	30cm ~ 50cm
b	61cm ~ 90cm
c	5cm ~ 10cm
d	120cm ~ 200cm
e	9cm ~ 14cm
f	10cm ~ 17cm

(Table 1) Range values for landmark items

Competition Rules

- There will be two rounds. Each round has different obstacle configurations and a digit number to use. Before starting each round, all the robots must be impounded. Players cannot modify programs during the impounding period. Each robot has a maximum of 3 minutes to run. If failed during a run, the robot's distance traveled will be recorded.
- The winner will be decided by (1) number of successful perfect runs (2) the best time of the two runs. (3) best distance traveled of the two runs
- The robot must be **restarted** if any violation such as touching the cups occurs. If you rerun, previous travel distance data will be reset. The course will be reset when restarted. The timer does not stop while the robot is being returned to the start position by the player. Therefore it is discouraged to restart if the robot is far away from the home base.
- Human player cannot have any interaction with the robot. For example, giving sound or visual signals to the robot is not allowed.

Robot Requirements

- Must be autonomous (No remote control by human driver or remote computer is allowed)
- Any robot platform with any vision system such as L2Bot is allowed to enter the competition
- Any number of onboard cameras (webcam or camcorder) can be used. You may use any other sensors such as digital compass, distance sensors, and LIDAR.
- Any programming language can be used.
- Width: must be less than 2ft (61cm), since minimum width of the path is 2ft (61cm).
- Length: less than 3ft
- Height: maximum 6ft
- Weight: no limit

Prize: Winner Trophies; High school team members of the winning team receive \$2,000 LTU renewable scholarships.

Competition Dates

- May 17, 2014 – World Championship 2014 at LTU (Practice course will be open May 16, 2014)

Questions: Contact Dr. Chung at chung@LTU.edu

- To purchase or lease an L2Bot
- To register (on-line or on-ground) classes to learn about vision centric robotics

Misc. Info

- Go to www.robofest.net/collegiate for more info and possible rule updates
- The event is open to the public. Admission is free. Parking is free



ROBOFEST Unknown Mission Challenge 2014

V2.0 1-23-14

Mission tasks will be totally unknown until the day of competition. The goal of this challenge is to provide an opportunity to develop problem solving skills on the fly without any help from adult coaches.

Teams may use only approved robot kits shown below, and must bring their own robot. Pre-assembled robots cannot be used. Sensor or motor multiplexors are not allowed.

- LEGO NXT sensors, motors, parts, and one NXT brick
- LEGO EV3 sensors, motors, parts, and one EV3 brick
- Arduino based kits such as Novabot-3
- More to come. Please contact Dr. Chung at chung@LTU.edu, if you want to list your company's product here.

Teams can use any programming language and they need to bring their own computer to program the robot. Maximum 2 members per team are allowed to form a team. No internet or cell phone use will be allowed.

There will be a waiting line for the practice field. As long as the practice field is available, teams have unlimited practice runs with their robot before the end of competition. Teams will have 2 "official" runs that will be judged. Winners will be decided by best score of the 2 official runs. Tie breaker will be the time of the best run.

Dates (Tentative)

- May 16, 2014, Part of World Championship at LTU, Southfield, MI

Age divisions

- Junior (5th ~ 8th grade): Maximum 20 teams
- Senior (9th ~ 12th grade): Maximum 20 teams

Tentative schedule (in case the competition is held in the morning):

- 8:00am: Check-In begins
- 8:25am: Unknown mission tasks are unveiled
- 8:30am: Competition begins
- 11:45am: Competition ends
- Noon: Awards

ROBOFEST 2014 Competition Video Qualifier Submission Form

About the team and coach

Team-ID	
Team Name	
Division and Category	<input type="checkbox"/> Junior Game <input type="checkbox"/> Junior Exhibition <input type="checkbox"/> Senior Game <input type="checkbox"/> Senior Exhibition
Team Organization	
Coach Name	
Coach Email Address	
Coach Phone Number(s)	

About the Video

Video contents	<input type="checkbox"/> Team and team member introduction, 5 seconds for each member <input type="checkbox"/> Robot Introduction for 10 seconds If Game category (For unknown factors, email to Robofest@LTU.edu) <input type="checkbox"/> Avoid Meltdown Game demo If Exhibition category, <input type="checkbox"/> Exhibition demo and presentation max. 4 minutes <input type="checkbox"/> Questions (coach can ask) and Answers max. 2 minutes <input type="checkbox"/> Rolling credit and/or acknowledgement (recommended)
Medium type	<input type="checkbox"/> Video Sharing Site link URL (preferred) : _____ <input type="checkbox"/> DVD <input type="checkbox"/> CD or DVD with a video file <input type="checkbox"/> Other
The medium included has been tested	<input type="checkbox"/> Yes <input type="checkbox"/> No

As a coach, I certify that the Robofest competition work was solely done by students and the video has **not** been edited, once the game or exhibition demonstration started until the end. Also the team information on the web is complete and up to date.

Coach Signature / Date

*Send this form together with the video medium (or video site link) received by
Friday April 11, 2014, Noon EDT to*

Robofest@LTU.edu

Faith Kurily, Robofest Coordinator
 LTU Robofest
 21000 West 10 Mile Rd.
 Southfield, MI 48075, USA

Robofest 2014 Age Division Waiver Request Form

At the time of the qualifying competition, Robofest Game and Exhibition Junior Division participants must be 5th-8th grade students and Senior Division participants must be 9th-12th grade students. For any exceptions, the coach must submit this form for approval.

Request Type (check only one)

Playing UP Playing Down

About the team and coach

Team-ID	
Team Name	
Competition Category	<input type="checkbox"/> Junior Game <input type="checkbox"/> Junior Exhibition <input type="checkbox"/> Senior Game <input type="checkbox"/> Senior Exhibition <input type="checkbox"/> Sr. VCC <input type="checkbox"/> Other: _____
Team Organization	
Number of team members	(Excluding the following student who is requesting the waiver)
Coach Name	
Coach Email Address	
Coach Phone Number(s)	

About the student who needs waiver

Student Name			
Age		Grade	
Specific reason and examples. <i>(If playing up, the student must have exceptional talent in both construction of the robot body and computer programming)</i>			
Maturity (please check one)	<input type="checkbox"/> The student has maturity to work with other team members <input type="checkbox"/> The student has NO maturity to work with other team members		

As a coach, I certify that the above information is correct. I also certify that I obtained consent from other team members and their parents regarding participation of the above student.

Coach Signature / Date

Send this form or scanned copy to Dr. CJ Chung by 3 weeks before the competition date:

Fax
248-204-3518

Email (preferred method)
chung@LTU.edu

Mail
Dr. CJ Chung
LTU Robofest
21000 West 10 Mile Rd.
Southfield, MI 48075, USA

Dr. Chung will notify the approval result by email to the coach.

ROBOFEST Informed Consent, Release and Media Authorization Form - REQUIRED FOR ALL PARTICIPANTS: Students, Teachers, Coaches, and Volunteers

For the purposes of this document, "Robofest" shall be Lawrence Technological University (LTU), and its officers, directors, employees, assigns, and agents, including any third party designated and approved by Robofest at any time. As used below, "Participant" shall mean any individual, student, mentor, coach, teacher or volunteer involved in a Robofest event. "Partners" shall mean individuals or entities that manage, organize, sponsor, and/or host Robofest events and Tournaments. In acceptance of my participation in any Robofest & related programs, meetings or events (collectively, the "Event"), I agree to the following:

I, the Participant, hereby grant to Robofest and its Partners the right to photograph and/or videotape me during my participation in an Event. I further grant to Robofest and Partners, throughout the world, the right to use these photographs and videotapes of my likeness, voice and sounds during my participation, and to license the right to reuse such photographs and videotapes of my participation, and my name, likeness and biography, in any and all media for any purpose, including advertising and other promotions of Robofest, and its Partners, without compensation to me. Each such photograph and videotape shall be a work for hire and Robofest shall be deemed the owner of any copyright and/or trademark rights therein. LTU may use my information for their program promotions.

The undersigned being fully cognizant of the risks in participating in an Event, hereby assumes the risks of bodily injury and property damage, inherent in such participation. I hereby waive any claims or causes of action which I may now or hereafter have against Robofest or its Partners, arising out of my participation, and I will indemnify and hold harmless Robofest, and its Partners against any and all claims resulting from such participation.

Informed Consent for Participation in Assessing the Impact of Autonomous Robotics Competitions in Math and Science Education – This applies to ONLY STUDENT Participants

I, the **Student Participant**, agree to participate in the Assessing the Impact of Autonomous Robotics Competitions in Math and Science Education conducted by the Department of Math and Computer Science, LTU, 21000 W. Ten Mile Rd, Southfield, MI, 48075, USA. I understand this research is a study to quantify students' improvements in Science, Technology, Engineering, and Mathematics skills through robotics competitions that require computer programming.

As part of my participation in this study, I understand I will be taking two survey-style online assessments with basic math and science questions and the data will be analyzed only by LTU researchers. My part of the study involves approximately 15 minutes for an assessment. I understand that I may not receive any direct benefit from my participation in this study, and that my participation is completely voluntary. I also understand that I may withdraw at any time from this study. I understand that my name or identity will not be used in reports or presentations of the findings of this research, i.e. the assessment results are completely anonymous.

I have read and understand this information and agree to participate in this study. I know this form can be obtained from the Robofest home page at www.robofest.net.

For questions or concerns about the research, please contact Dr. CJ Chung, Associate Professor, Department of Math and Computer Science, 248-204-3568. For concerns about your treatment as a research participant, please contact the Institutional Review Board (IRB) at LTU, IRB@ltu.edu.

_____ Signature of Participant (Not necessary if under 18)	_____ Printed Name of Participant (Required)	_____ Date
_____ Signature of Parent or Legal Guardian (If Participant is a Minor under 18)	_____ Printed Name of Parent or Legal Guardian	_____ Date
Address of Participant: _____		Age (If minor): _____
City: _____	State: _____	Country: _____
Zip: _____		
Phone: Home _____	Cell: _____	
Team ID: _____	Team Organization Name: _____	

This signed form must be submitted by Coach, preferably, for all participants when checking in at all Robofest Sites.